

# Data analysis drives ICU improvement

## Sarasota Memorial Hospital

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**Dr. Bruce Fleegler**  
Chief Medical  
Officer

### Client at a Glance

**Location:** Sarasota, Fla.

**Beds:** 828

**Cerner solutions:**  
Critical outcomes

Every day, the intensive care unit (ICU) professionals at Sarasota Memorial Hospital—an organization ranked among *U.S. News & World Report*’s “America’s Best Hospitals”—provide vital care for very sick patients. By applying innovative healthcare information technology solutions (HIT), Sarasota’s ICU staff continually improves patient care quality and survival rates. By measuring, collecting and analyzing data such as risk-adjusted length of stay and mortality rate, the team increased efficiency to generate total variable cost savings of \$3 million.

Beginning in 2001, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) convened an expert panel to develop a set of core measures for ICUs. JCAHO’s pilot program included two *APACHE III* measures—risk-adjusted hospital mortality for ICU patients and risk-adjusted ICU length of stay.

Sarasota Memorial Hospital—which has used *APACHE III* to monitor and improve its ICU since 1995, capturing data on more than 42,000 patients—has tracked improvement in both measurements. The organization’s use of *APACHE III* to contribute to quality improvement initiatives has resulted in the opportunity to present at CHEST and to contribute to *Critical Care Medicine*, the journal of the Society of Critical Care Medicine.

“Sarasota Memorial Health Care System’s mission is to be the best publicly owned system in the country,” said Dr. Bruce Fleegler, chief medical officer. “*APACHE* has allowed us to document outcomes in the ICU as well as identify opportunities for process improvement and unit organization.”

Sarasota’s innovative approach to ICU management is bolstered by JCAHO’s core measure initiative, as well as a 2003 report from the critical care professional societies, *Framing Options for Critical Care*. The report stated that critical care medicine is “caught in a perfect storm” that includes growing demand for ICU services,



pressure from the business community to improve quality and reduce errors and variance, growing workforce shortages and economic pressures to reduce healthcare costs.

### Data driving benefits

*APACHE III* helps Sarasota Memorial drive operational improvement through outcomes measurement and analysis. The hospital consists of 32 medical-surgical, 10 open-heart recovery and 10 cardiac-medical beds. Located in a resort community, Sarasota Memorial experiences dramatic increases in patient volume during the winter months, an annual challenge to managing ICU resources.

Sarasota Memorial’s *APACHE III* system captures and analyzes the core dataset required to measure and compare outcomes and resource use retrospectively, as well as provides real-time individual patient risk predictions and trends. The system also enables users to calculate the Therapeutic Intervention Scoring System (TISS) to estimate and predict nurse staffing requirements, collect data such as adverse events or specific therapies and link to patient outcomes.

Sarasota has achieved numerous benefits by combining data with risk-adjusted outcomes information for analysis and reporting, including:

## Key Benefits

- Reduced risk-adjusted ICU and hospital mortality rates to levels under national norms
- Improved ICU utilization through the reduction in low-risk monitor (LRM) admissions from 47 percent to 35 percent, leading to cost reductions
- Saved more than \$2 million due to decreased length of stay
- Reduced ICU readmissions within 24 hours from 3 percent to 1 percent, while maintaining risk-adjusted ICU length of stay ratio

- Provided data to reorganize the Medical-Surgical-Neuro and Intermediate Intensive Care critical care services into one unit with a better staffing ratio.
- Documented the value of continuous lateral rotation therapy in treating adult respiratory distress syndrome and supported a more cost-effective method of providing that therapy.
- Reduced ICU ventilator days by 17 percent from 2002 to 2005.
- Steadily reduced risk-adjusted ICU and hospital mortality rates by 38 percent over the 10-year period since implementing *APACHE III*.
- Improved ICU utilization through the reduction in low-risk monitor (LRM) admissions from 47 percent to 35 percent, leading to cost reductions. Specifically, the organization reduced congestive heart failure LRM admissions from 21 percent to 10 percent between 1999 and 2003.
- Saved more than \$2 million due to decreased hospital length of stay. Specifically, achieved a cost savings of \$640,000 over five years due to reduced ICU utilization for LRM carotid endarterectomy patients.
- Increased carotid endarterectomies bypassing the ICU from 12 percent to 81 percent, generating a savings of approximately \$300,000. Also reduced length of stay for carotid endarterectomies in the PACU from six hours to four hours.
- Facilitated demonstration of savings exceeding \$100,000 by applying data-driven infection control benchmarking. Specifically, *APACHE III* enabled the calculation of infection rates in a manner consistent with the Centers for Disease Control's cohort study and proposed JCAHO core measures.
- Reduced ICU readmissions within 24 hours from 3 percent to 1 percent, while maintaining risk-adjusted ICU length of stay ratio.

## ICU innovation

Most hospitals using the *APACHE III* system utilize Health Level Seven (HL-7) interfaces to capture admitting, transfer, discharge and lab information into the *APACHE III* database. In addition to this

use, Sarasota Memorial was the first hospital in the United States to connect the *APACHE III* system directly with a critical care clinical information system.

## Daily data application

Each morning, the Sarasota Memorial nursing staff verifies new ICU admissions to ensure accurate patient profile data entry and calculate new individual predictions. Each patient's Details and Trends system report is printed and placed in front of a physician's progress notes. Data in this report includes the current *APACHE III* score, acute physiology score and predictions. This data is provided during multidisciplinary rounds to doctors and nurses trained to interpret use of *APACHE III* data.

"In my daily activities, I use *APACHE* to help identify the low-risk monitor patients—patients who are being monitored and not receiving a so-called 'active therapy,'" said Rhonda Anderson, R.N., clinical nurse specialist for adult critical care units. "These are patients who may not meet the ICU admission criteria to the letter, so they may be identified as potential transfers should we get into a bed crunch. This can also assist in helping to identify inappropriate admissions."

Anderson applies *APACHE III* data to track and improve the patient care her team delivers.

"We can benchmark ourselves against other institutions, based on acuity, number of beds and other data regarding patient outcomes," she explained. "*APACHE* data also helps us identify opportunities for improvement in care. This data can be a strong stimulus for change when dealing with physicians. As I make rounds, I also like to see the color screen that reflects acuity and predictions. A lot of red means higher acuities and much sicker patients. This helps me get an idea of staffing needs."

In addition, *APACHE III* data enables nurses like Anderson to work much more efficiently. She can collect more accurate data, for example, on infection control statistics such as the number of ventilation days and catheter days.

"I rely heavily on the *APACHE* data generated at Sarasota Memorial," Anderson said. "I know that it is accurate, and there is the flexibility available to maximize its capabilities to provide pertinent information."